POLITECNICO DI MILANO

Scuola di Ingegneria Industriale e dell'Informazione
Dipartimento di Elettronica, Informazione e Bioingegneria

Corso di Laurea Magistrale in
Ingegneria Informatica

TITOLO TESI

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Tesi di Laurea Magistrale di:

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DEDICHE

medskip Here you can put your dedication, like:

To time, that do not go backwards

— A & E

RINGRAZIAMENTI

Here you can put acknowledgements to people that helped you during the thesis. Remember that helping students to write thesis is part of the job of some of them, and they're also paid for that. Please make sure to thank them for what they weren't supposed to do.

Remember also that this page is part of your thesis. I know that your boyfriend/girlfriend is very important to you and you cannot live without her/him, as it is for me. But there's no need to put her/his name here unless she/he gave a proper contribution to this work. Same goes for friends, parents, drinking buddies and so on.

INDICE

ELENCO DELLE FIGURE

ELENCO DELLE TABELLE

LISTINGS

ACRONYMS

OS operating system

XML eXtensible Markup Language

SOMMARIO

Per sommario si intende il sommario di un documento, senza l'aggiunta di interpretazioni e valutazioni. Il sommario si limita a riassumere, in un determinato numero di parole, gli aspetti fondamentali del documento esaminato. Solitamente ha forma "indicativo-schematica"; presenta cioé notizie sulla struttura del testo e sul percorso elaborativo dell'autore.

Max 2200 caratteri compresi gli spazi.

Parte I

WRITING A MASTER THESIS

You can put some informational part preamble text here.

1 AN INTRODUCTION TO THE WRITING OF SCIENTIFIC TEXTS

Science, my boy, is made up of mistakes, but they are mistakes which it is useful to make, because they lead little by little to the truth.

— verne_journey:1957 verne_journey:1957

1.1 THE STRUCTURE OF A SCIENTIFIC TEXT

1.2 BIBLIOGRAPHIES AND LITERATURE REVIEWS

1.3 A TENTATIVE INDEX

1.4 FOLLOW THE INSTRUCTIONS

Visit this link for the updated information about the content of the thesis.

«Alcune Scuole forniscono linee guida specifiche cui i laureandi devono attenersi per la redazione della tesi. Per ulteriori informazioni: www.tedoc.polimi.it/...»

1.4.1 *Archiving electronic documents: PDF/A*

PDF/A is an ISO-standardized version of the Portable Document Format (PDF) specialized for the digital preservation of electronic documents. PDF/A differs from PDF by prohibiting features ill-suited to long-term archiving, such as font linking (as opposed to font embedding). The ISO requirements for PDF/A file viewers include color management guidelines, support for embedded fonts, and a user interface for reading embedded annotations.

Universities usually requires this standard but they're also not aware that common programs like MS Word, OpenOffice and so on aren't really able to produce compliant PDFs. In Latex, there's some development going on but at the time of writing, the available commands are still too obscure and buggy. So in the end, forget the PDF/A for now.[1]

1 Or DIY and then make a pull request on github :D.

Parte II

USING THIS LATEX TEMPLATE

Another informational part preamble text here.

2 PRACTICAL GUIDE TO «CLASSICTHESIS AT DEIB»

This template is ready to be used when writing a thesis at Dipartimento di Elettronica, Informazione e Bioingegneria. It is a modified version of Classic Thesis by André Miede that can be found here http://code.google.com/p/classicthesis/.

2.1 LEARN LaTeX

LaTeX is a document preparation system and document markup language. It is widely used for the communication and publication of scientific documents in many fields, including mathematics, physics, computer science, statistics, economics, and political science.

LaTeX users are weird people who care about the ligature between «f» and «i» and gets pissed off every time they look at a MS Word document. Nevertheless, they can explain themselves very well as shown in some beautiful guides for the LaTeX world. My preferred one for beginners is «The Not So Short Introduction to LaTeX 2_ε», which can be found here.[1] For italians I also strongly suggest «L'arte di scrivere con LaTeX», that can be found here.[2] It contains everything needed, however I suggest the reading of chapter 3 for a short introduction. «ClassicThesis» is another guide of the same author that can be useful, download it here.[3]

2.2 INSTALL LaTeX

If you don't have already a LaTeX system installed, this section will explain everything you need. The easiest way to get LaTeX is to install TeXLive, which works on all operating systems (OSs). In https://www.tug.org/texlive/ you find the instructions and the files needed - and also get in touch with minimalism of TeXusers.

Then you will need an editor: I strongly recommend TeXworks because it's very simple and available on all the platforms. Also you don't need to install it, it's already included in TeXLive. The official documentation of TeXworks is available here;[4] I strongly recommend the reading of chapter 3. Alternatevely you can read an italian manual: profs.sci.univr.it/... (just 13 pages, read it!).[5]

1 http://www.ctan.org/pkg/lshort
2 http://www.lorenzopantieri.net/LaTeX_files/ArteLaTeX.pdf
3 http://www.lorenzopantieri.net/LaTeX_files/ClassicThesis.pdf
4 https://docs.google.com/file/d/0B5iVT8Q7W44pMk1WSFRKcDRlMU0/preview
5 If you already have a preferred editor, just keep using yours.

After opening TeXworks, I strongly suggest to set these two additional things:

- open Preferences, then go the Composition tab: in the second box there, the «Process instruments», push the plus button. In the window just opened, write `Biber` in the «Name» field, `biber` in the «Program» field (lowercase!) and then press the plus button to add the argument `$basename`;
- again in the same window, set «Hide console output» to «never».

Then just test the installation of the template:

A. go into the template home folder;

B. open the file `ClassicThesis_DEIB.tex`;

C. select `pdfLaTeX` from the dropdown menu in the top right of the TeXworks window;

D. press the rounded green button: it compiles the `.tex` file for the first time and open the resulting `.pdf`;

E. select `Biber` from the same dropdown menu and press again the green button: this compiles the bibliography, a thing you need to repeat only when you change the file `Bibliography.bib`;

F. select `pdfLaTeX` again and recompile: this is needed to build indices and crossreferences;

The above compilation procedure is the standard way to translate the LaTeX code into pdfs.

2.3 ONLINE EDITOR

If the above procedure seems too difficult to you and you have an internet connection always available, you might think to use an online editor. The best choice at the time of writing is `http:\\sharelatex.com` where you can even find this template after registration to the site by looking for «Classic Thesis At DEIB». Your project will be saved on their server but you can also download them. The platform allows up to two authors for free accounts.

There is no need to provide instructions for its use since the website has them. They also have an online LaTeXguide which is also very useful.

2.4 BUILDING BLOCKS

2.4.1 *File structure*

The template is organized in multiple file and folders:

A. `ClassicThesis_DEIB.tex` is the main file to be compiled, found in the root folder. You should just add the source filenames you want to include and any hyphenation you need to explictly specify.

B. `classicthesis-config.tex` contains options that can be chosen for this template, like the `draft` one that prints date and time at the bottom of every page. It contains also the definition for the title, the author and others stuff displayed in the titlepage. Comments within the file should guide you.[6] Take a look at it!

C. `Bibliography.bib` is the *Bibtex* database: it is a normal textfile where you should put books and articles read;

D. `Chapters` contains the files for the main chapters of your thesis; this is where you will add the chapters text, as well these very words in line 41 of the file `Conclusion.tex`;

E. `CodeFiles` contains any code snippet you want to include in your thesis with the environment `listings`; it might be some relevant Matlab or C code, as well as long bash scripts;

F. `FrontBackmatter` contains various files that are included in the main one to produce abstract, titlepages, acknowledgements, ... Follow the instructions below to modify them in order to suits your needs;

G. `Images` contains the `.pdf` or `.png` versions of the images of the thesis. A `sources` subfolder is also provided for keeping things well organized.

To modify abstract, preface, acknowledgements snd acronyms, you need to go into the folder `FrontBackmatter` where you will find the following:

ABSTRACT.TEX contains the text displayed as «abstract» and «sommario» just after the list of figures, tables, etc. Modify the text and leave the rest.

ACKNOWLEDGMENTS.TEX contains the text put just before the table of contents. Modify the text to suit your needs.

6 comments are the rows starting with %.

ACRONYMS.TEX contains the environment `acronym` with the definition of all the acronyms that will be used within the text. Add your own to the list and put the longest as parameter of the environment.

AUTOPARTS folder contains things that should work without your intervention. Forget them.

DEDICATION.TEX same usage and structure as `Acknowledgements.tex`.

ESTRATTO.TEX Politecnico di Milano requires an italian long excerpt of theses written in foreign languages.

FRONTESPIZIO.TEX and `FrontespizioIT.tex` are the cover page in english and italian, respectively. Politecnico di Milano requires the italian version of the english cover, so there it is. Both should work perfectly if you modify section 2 of the file `classicthesis-config.tex`, but you may not like the style so modify them as you prefer.

PREFACE.TEX same usage and structure as `Acknowledgements.tex`.

PUBLICATION.TEX same usage and structure as `Acknowledgements.tex`, but not included by default. Activate it by uncommenting the relevant line in `ClassicThesis_DEIB.tex`.

RETROFRONTESPIZIO.TEX contains the colophon. In most cases is fine as it already is.

2.4.2 *Environments*

The command graffito is used to put some text here, usefull to underline important things before long paragraphs.

In addition to common LaTeX environments, this thesis is set to use:

- `\begin{aenumerate}` to produce an `\enumerate` with letters instead of numbers, as in the file list above;
- `\blockcquote[][]{}{}` to «produce a citation with reference to author and page» [**bringhurst:2002**]. If the citation is longer than two rows is indented. This is provided by the package `csquotes`, which settings are in `classicthesis-config.tex`. The package also provides `\enquote{the citation}` that produces «correct citation style» according to the language in use.
- `\ac{}` and its variations, defined by package `acronyms`, provide nice handling for acronyms, like eXtensible Markup Language (XML), produced with the code `\ac{XML}`. List them within the environment `acronym` in the file `FrontBackmatter/Acronyms.tex`.
- the so called semi-dynamic referencing for chapter, sections, subsections, appendices, figures, tables and equations. They are a set of commands like `\myChap{label_key}` that produce things like capitolo 1. There are also capital versions of the commands

(`\MyChap{}` produces Capitolo 1). They need a `\label{name}` anchor next to the referred thing.

  - `\myChap` for chapters;
  - `\mySec` for sections;
  - `\mySubsec` for subsections;
  - `\myAppendix` for appendices;
  - `\myFig` for figures;
  - `\myTab` for tables;
  - `\myEq` for equations;

- references to bibliography are produced in the usual way with `\cite{bib_key}` [**bringhurst:2002**] and its variations `\citeauthor{bib_key}`, `\citetitle{bib_key}` and others.

- figures are handled usually with the code

```
\begin{figure}
\centering
\includegraphics[width=\columnwidth]{Images/your_image_name.pdf}
\caption[Short description]{Long description.}
\label{fig:a_name}
\end{figure}
```

  which produces things like figura 2.1. Of course, you need to put the image file `your_image_name.pdf` in folder `Images/`.

- tables are produced with

```
\begin{table}[tb]
\footnotesize
\centering
\begin{tabularx}{0.8\textwidth}{llrcl}
\toprule
\tableheadline{l}{Algorithm} &
\tableheadline{l}{Parameter} &
\tableheadlineMore{3}{c}{Suggested Values} \\
\midrule
\tablefirstcol{l}{Any}
& \acs{NFE}  & $10\,000 $ & $ \div $ & $ 200\,000$ \\
& Population Size  &  $10 $ & $ \div  $ & $ 1000$ \\
\midrule
\tablefirstcol{l}{\ac{GDE3}}
& \ac{DE} step size & $0.0 $ & $\div $ & $ 1.0$ \\
& Crossover rate  & $0.0$ & $ \div $ & $ 1.0$ \\
\bottomrule
\end{tabularx}
```

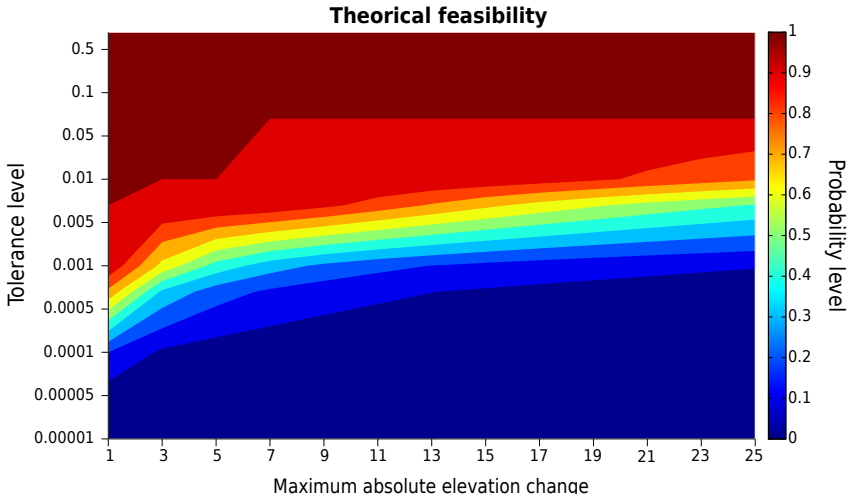

Figura 2.1: Thing taken from our master thesis whose meaning have been completely forgotten.

ALGORITHM	PARAMETER	SUGGESTED VALUES
Any	NFE	10 000 ÷ 200 000
	Population Size	10 ÷ 1000
GDE3	DE step size	0.0 ÷ 1.0
	Crossover rate	0.0 ÷ 1.0

Tabella 2.1: Parameters needed for things that are not needed anymore themselves.

```
\caption[Short description]{Long description.}
\label{tab:MOEAandParameters}
\end{table}
```

which produces tabella 2.1. `\myfloatalign`, `\tableheadline{}{}` and its variation `\tableheadlineMore{}{}{}` and `\tablefirstcol{}{}` are used to give a common style to all tables in the document. They are defined in `classicthesis-config.tex`.[7]

- equation are produced in classic LaTeX way and they turn out be something like this

$$\nabla \mathbf{q_s} = U(x, y) - b_t \tag{2.1}$$

7 Also do not forget footnotes, created by `\footnote{}`, which should be placed after the punctuation mark.

2.5 CONTRIBUTING TO THIS TEMPLATE

Suggestion and improvements are welcome at https://github.com/Lordmzn/ClassicThesis-at-DEIB or via email at emanuele.mason@polimi.it or andrea.cominola@polimi.it.

Parte III

APPENDIX

APPENDIX EXAMPLE

We have seen that computer programming is an art,
because it applies accumulated knowledge to the world,
because it requires skill and ingenuity, and especially
because it produces objects of beauty.

— knuth:1974 knuth:1974 knuth:1974

A.1 THE `listings` PACKAGE TO INCLUDE SOURCE CODE

Source code is usually not part of the text of a thesis, but if it is an original contribution it makes sense to le the code speak by itself instead of describing it. The package `listings` provide the proper layout tools. Refer to its manual if you need to use it, an example is given in listing A.1.

Listing A.1: Code snippet with the recursive function to evaluate the pdf of the sum Z_N of N random variables equal to X.

```
std::vector<int> values_of_x(number_of_values_of_x,
  min_value_of_x);
for (unsigned int i = 1; i < number_of_values_of_x; i++) {
  values_of_x[i] = values_of_x[i - 1] + 1;
}
prob_x = 1.0 / number_of_values_of_x;
std::vector<std::vector<double> > p_z;
for (unsigned int idx = 0; idx < p_z.size(); idx++) {
  p_z[idx] = std::vector<double>(
    (max_value_of_x * (idx + 1) - min_value_of_x
      * (idx + 1)) + 1, INIT_VALUE);
}

double prob(int Z, int value_of_z) {
  if (value_of_z < min_value_of_x * Z ||
    value_of_z > max_value_of_x * Z) {
      return 0.0;
  }
  if (value_of_z < min_value_of_z ||
    value_of_z > max_value_of_z) {
      return 0.0;
  }
  int idx_value_of_z = -(min_value_of_z - value_of_z);
  int idx_N = Z - 1;
  if (p_z[idx_N][idx_value_of_z] == -2.0) {
    if (Z > 1) {
      double pp = 0.0;
      for (unsigned int i = 0; i < number_of_values_of_x; i++) {
        pp += prob(Z - 1, value_of_z - values_of_x[i], p);
      }
      p_z[idx_N][idx_value_of_z] = prob_x * pp;
    } else {
      if (Z == 1) {
        for (unsigned int j = 0; j < number_of_values_of_x; j++)
            {
          if (value_of_z == values_of_x[j]) {
            p_z[idx_N][idx_value_of_z] = prob_x;
            break;
          }
        }
      }
      if (p_z[idx_N][idx_value_of_z] == INIT_VALUE) {
        p_z[idx_N][idx_value_of_z] = 0.0;
      }
    }
  }
  return p_z[idx_N][idx_value_of_z];
}
```